

We Claim

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1. A method of extracting coal fines from an aqueous phase containing suspended coal fines and hydrophilic mineral matters comprising mixing an extraction oil with the coal fines suspended in said aqueous phase, the oil being added in an amount effective to extract the coal fines by hydrophobic extraction and form a nonaqueous phase containing said coal fines and said oil and a modified aqueous phase containing said hydrophilic mineral matters, adding at least one of a flocculating agent, a coagulating agent or a combination of said flocculating agent and said coagulating agent to at least one of said aqueous phase and said modified aqueous phase to separate said hydrophilic mineral matters and provide a clarified aqueous phase.

2. A method as defined in claim 1 wherein said mixing of said extraction oil and said adding of said at least one of said flocculating agent, said coagulating agent or said combination of the two for recovering fine coals is integrated into a single stage.

3. A method as defined in claim 2 wherein said single stage includes removing said mineral matters from said aqueous phase to provide said clarified aqueous phase for recycling.

4. A method as defined in claim 1 wherein said extraction oil is added in the amount of between about 100 and 250 % based on the dry weight of the coal fines in the suspension.

5. A method as defined in claim 1 wherein said extraction oil is selected from the group [including] heavy crude, light mineral oils, fuel oils and landfill gas condensates

6. A method as defined in claim 1 wherein said one comprises said flocculating agent, which is added to a concentration below 30ppm.

7. A method as defined in claim 6 wherein said flocculating agent is selected from the group [comprising] cationic and anionic flocculants.

8. A method as defined in claim 1 wherein said one comprises said coagulating agent, which is added to a concentration of up to about 1000 ppm.

9. A method as defined in claim 8 wherein said coagulating agent is selected from the group [comprising] positively charged aluminum hydrosols and suitable multivalent cations

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10. A method as defined in claim 1 wherein said one comprises said combination of said flocculating agent and said coagulating agent for separation of said hydrophilic mineral materials from said aqueous suspension.
11. A method as defined in claim 10 wherein said flocculating agent is an anionic flocculants and said coagulating agent comprises suitable multivalent cations
12. A method as defined in claim 11 wherein said flocculating agent is added to a concentration below 30 ppm
13. A method as defined in claim 12 wherein said coagulating agent is added to a concentration of up to about 1000 ppm.
14. A method as defined in claim 13 wherein said flocculating agent and said coagulating agent are mixed in the ratio of between 1/10 and 1/100 of flocculating agent to coagulating agent.
15. A method as defined in claim 2, wherein said extraction oil is added in the amount of between about 100 and 250 % based on the dry weight of the coal fines in the suspension.
16. A method as defined in claim 2 wherein said extraction oil is selected from the group including heavy crude, light mineral oils, fuel oils and landfill gas condensates
17. A method as defined in claim 2 wherein said one comprises said flocculating agent, which is added to a concentration below 30ppm.
18. A method as defined in claim 17 wherein said flocculating agent is selected from the group comprising cationic and anionic flocculants.
19. A method as defined in claim 2 wherein said one comprises said coagulating agent, which is added to a concentration of up to about 1000 ppm.
20. A method as defined in claim 19 wherein said coagulating agent is selected from the group comprising positively charged aluminum hydrosols and suitable multivalent cations

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